

WHAT IS CLAIMED IS:

1 1. A system for determining propagation
2 characteristics of a photonic structure having a transverse
3 N-fold symmetry, comprising:

4 a numerical analyzer that employs a leading order
5 systematic homogenization expansion having multiple scales
6 to develop an angularly averaged indexed profile for said
7 photonic structure; and

8 a principal corrector, associated with said numerical
9 analyzer, that employs details of said photonic structure
10 and said homogenization expansion to obtain effective
11 refractive indices of modes of said photonic structure.

1 2. The system as recited in Claim 1 wherein said
2 modes are bound modes and said numerical analyzer
3 incorporates decaying boundary conditions at spatial
4 infinity.

1 3. The system as recited in Claim 1 wherein said
2 modes are leaky, scattering or quasi-modes and said
3 numerical analyzer incorporates outward-going radiation
4 boundary conditions.

1 4. The system as recited in Claim 1 wherein said
2 photonic structure has a simple layered potential
3 corresponding to a simple layered refractive index profile.

1 5. The system as recited in Claim 1 wherein said
2 photonic structure has an arbitrary geometry.

1 6. A method of determining propagation
2 characteristics of a photonic structure having a transverse
3 N-fold symmetry, comprising:

4 employing a leading order systematic homogenization
5 expansion having multiple scales to develop an angularly
6 averaged indexed profile for said photonic structure; and

7 employing details of said photonic structure and said
8 homogenization expansion to obtain effective refractive
9 indices of modes of said photonic structure.

1 7. The method as recited in Claim 6 said modes are
2 bound modes and said employing said leading order
3 systematic homogenization expansion comprises incorporating
4 decaying boundary conditions at spatial infinity.

1 8. The method as recited in Claim 6 wherein said
2 modes are leaky, scattering or quasi-modes and said
3 employing said leading order systematic homogenization
4 expansion comprises incorporating outward-going radiation
5 boundary conditions.

1 9. The method as recited in Claim 6 wherein said
2 photonic structure has a simple layered potential
3 corresponding to a simple layered refractive index profile.

1 10. The method as recited in Claim 6 wherein said
2 photonic structure has an arbitrary geometry.

1 11. A photonic structure designed by the method of
2 Claim 6.

1 12. A photonic structure designed by the method of
2 Claim 7.

1 13. A photonic structure designed by the method of
2 Claim 8.

1 14. A photonic structure designed by the method of
2 Claim 9.

1 15. A photonic structure designed by the method of
2 Claim 10.